YOUNG HUSBAND DEVELOPMENT STAGE 2

2-50 ELIZABETH STREET

KENSINGTON

ENVIRONMENTAL WIND ASSESSMENT

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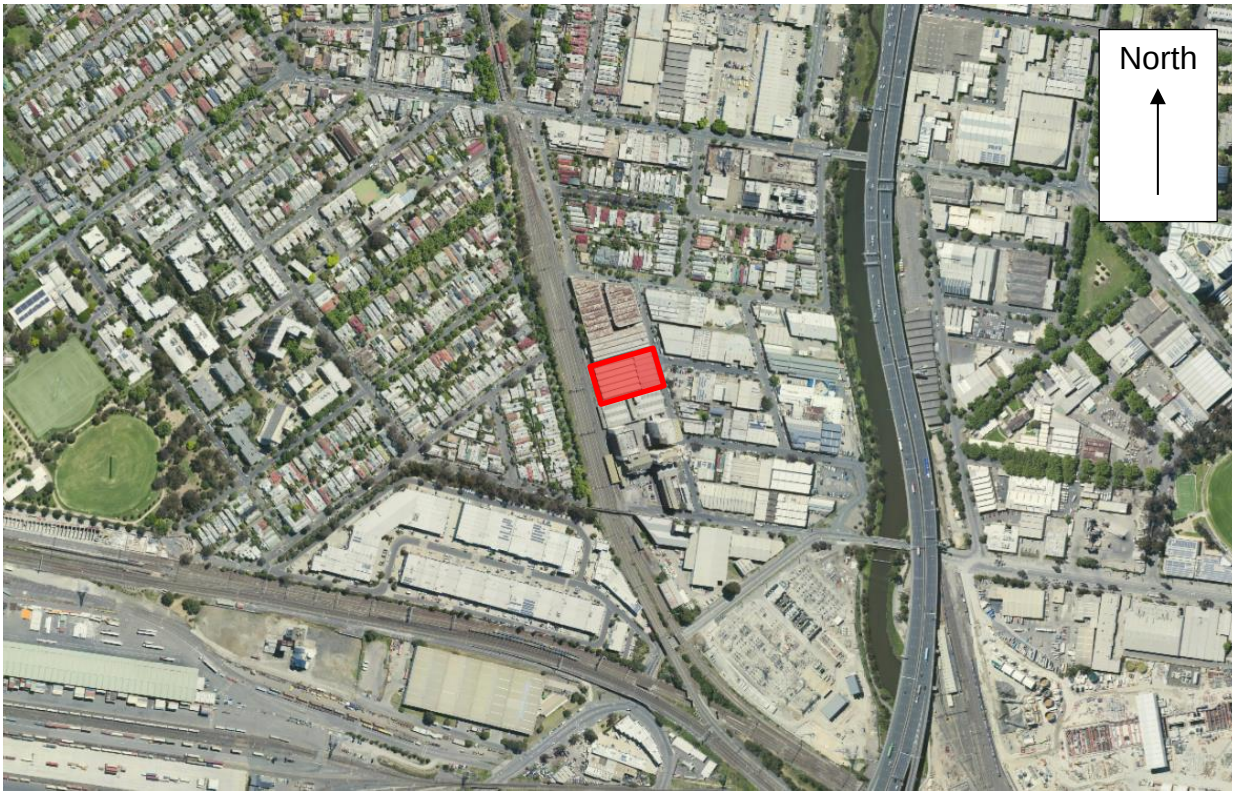
CONTENTS

1 INTRODUCTION

The proposed Stage 2 development at 2-50 Elizabeth Street, Kensington, will be comprised of two office buildings with heights of approximately 43m and 26m high respectively, located on the west side of Elizabeth Street between Arden and Chelmsford Streets as highlighted in Figure 1.



Proposed Development

Figure 1: Location of the proposed Stage 2 development of the 2-50 Elizabeth Street, Kensington site.

This assessment is based on a review of drawings prepared by Woods Bagot Architecture dated received up to 30th November 2020, and only considers current existing surrounds (i.e. no proposed future buildings). This desktop environmental wind assessment is based on MEL Consultants knowledge of wind flow around buildings and structures from undertaking numerous wind tunnel model studies, no wind tunnel study has been undertaken for this study.

2. THE DEVELOPMENT

The Stage 2 development at 2-50 Elizabeth Street, Kensington will be comprised of an 8-storey office building (S4) on the west side of the site and a smaller 5 level office building (S3) on the east side of the site. Both buildings have hospitality and retail tenancies on the Lower Ground and Ground Floors which can be seen in Figures 2 and 3 respectively. The main foyer through which the S4 office building is entered can be accessed via outward swinging doors from the under-croft passage created between the Ground Floor tenancies. The hospitality tenancy at the northwest corner of the Ground Level of the S4 building can be accessed via swinging doors from the under-croft passage and from the west side of the site that backs onto the Railway Line. The retail tenancy at the southwest corner of the Ground Level of the S4 building is also accessed via swinging doors from the west side of the site. These west facing entrances are located behind the colonnade style façade and under croft. The Lower Ground level retail tenancy of the S4 building at the northeast corner is accessed from the courtyard between the S3 and S4 buildings. The Lower Ground floor lobby and hospitality tenancy entrances of the S3 building are located on the courtyard between buildings S3 and S4 and on Elizabeth Street. The carpark for both buildings is accessed from Elizabeth Street.

To create balconies between the rounded façade and the square S4 office building, the built form is set back at corners and inset into the facades at different locations at each level. The locations of these balconies at Levels 2, 4 and 7 can be seen in Figures 4, 5 and 6. At Levels 2 and 4 the S3 office building is setback from the east façade to create terraces. The Level 4 roof terrace provides outdoor seating to the Level 4 Food and Drink Premises as can be seen in Figure 5. The south elevation of the proposed development can be seen in Figure 7.

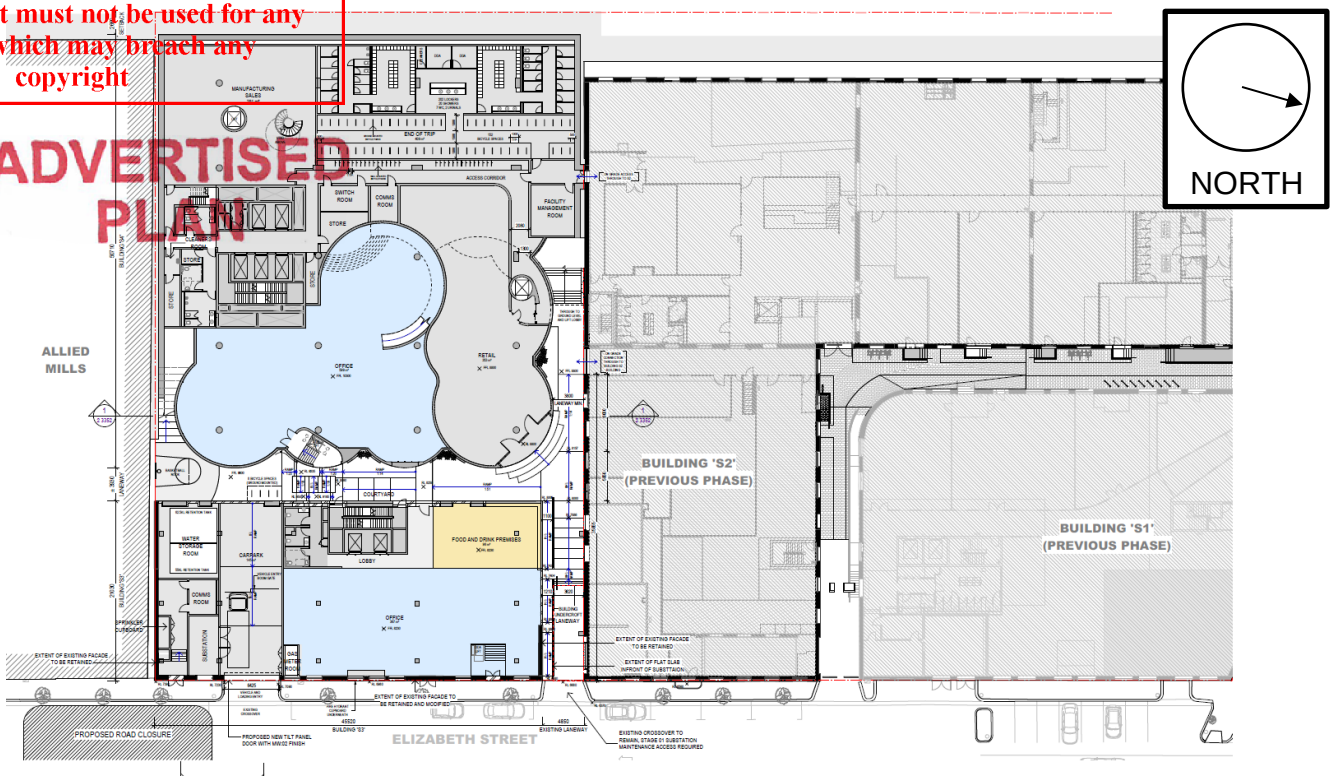


Figure 2: Lower Ground floor plan of Stage 2 of the proposed 2-50 Elizabeth Street development

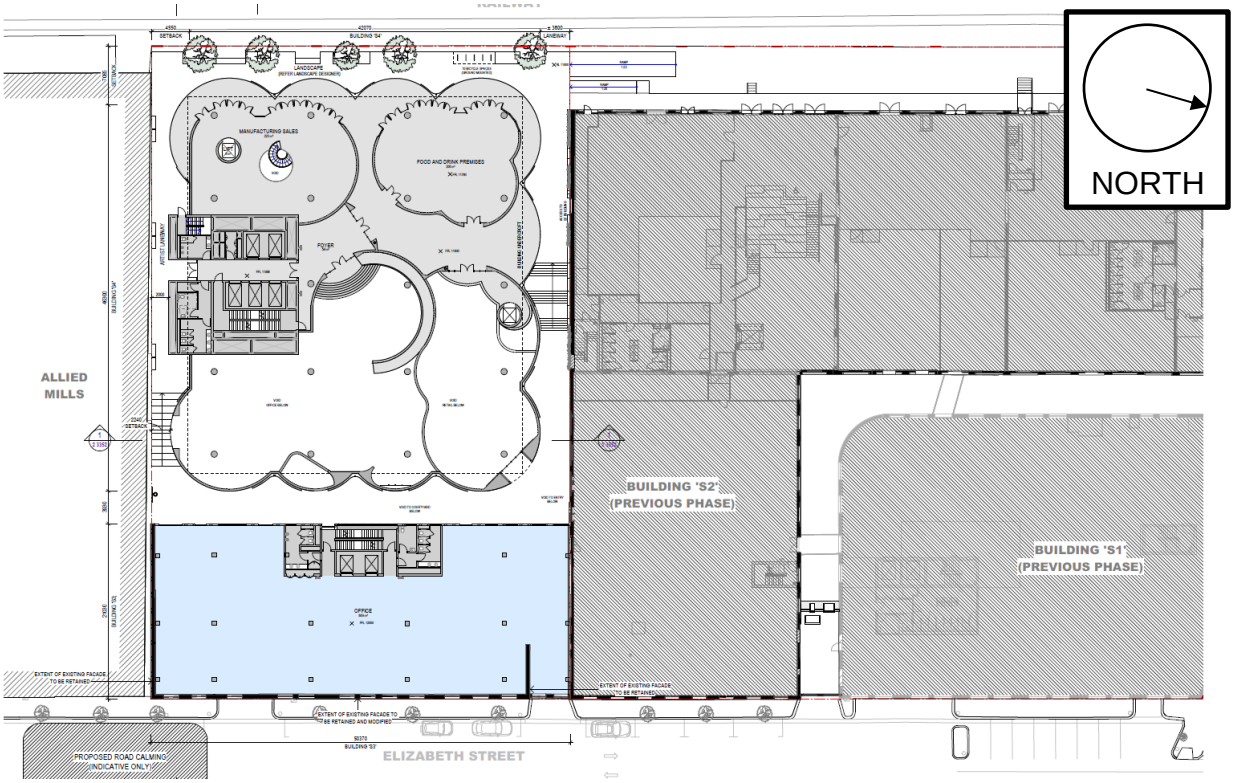


Figure 3: Ground floor plan of Stage 2 of the proposed 2-50 Elizabeth Street development

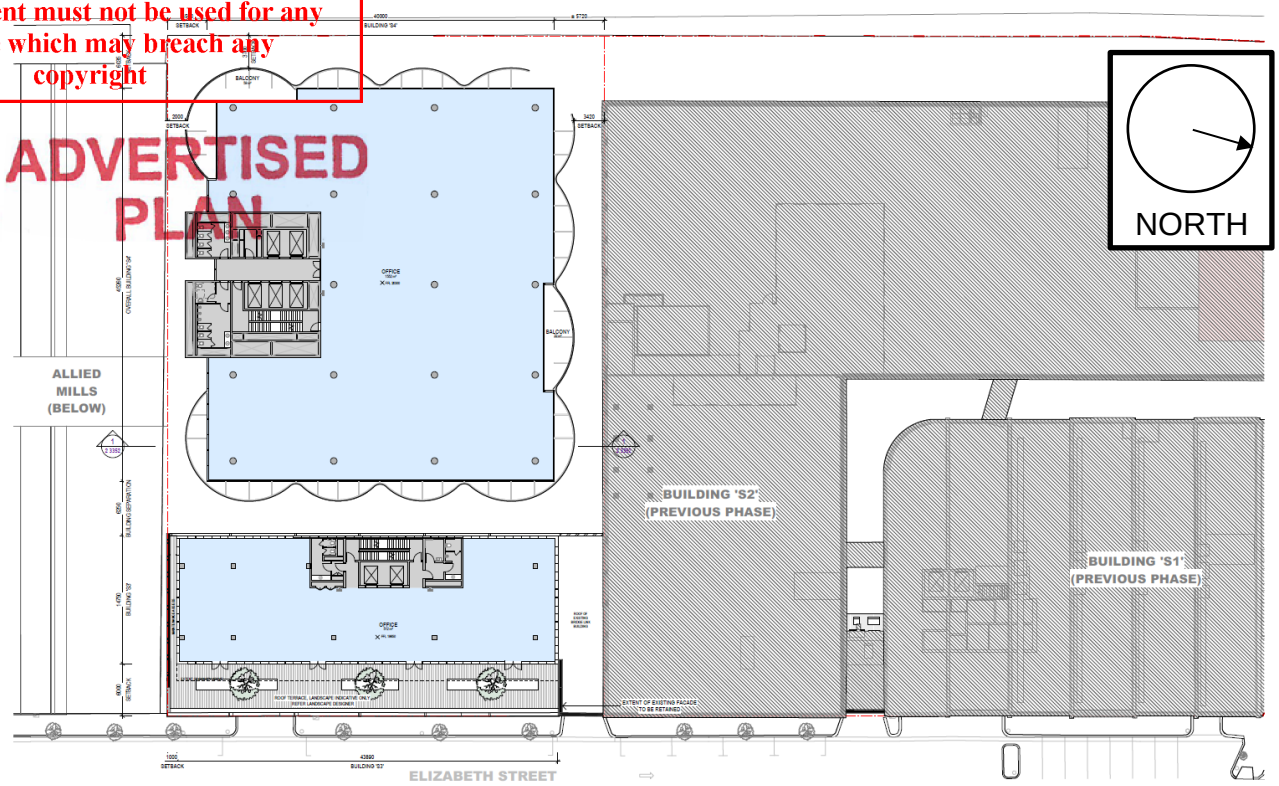


Figure 4: Level 2 floor plan of Stage 2 of the proposed 2-50 Elizabeth Street development

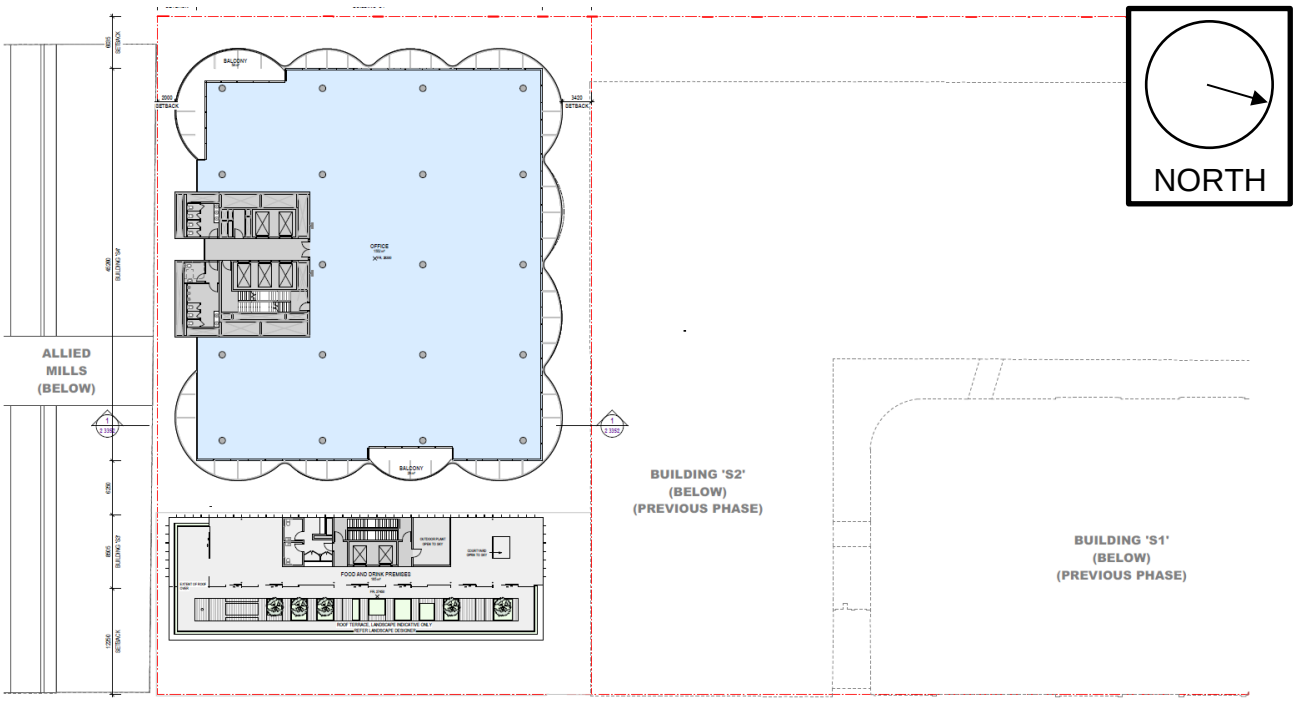


Figure 5: Level 4 floor plan of Stage 2 of the proposed 2-50 Elizabeth Street development

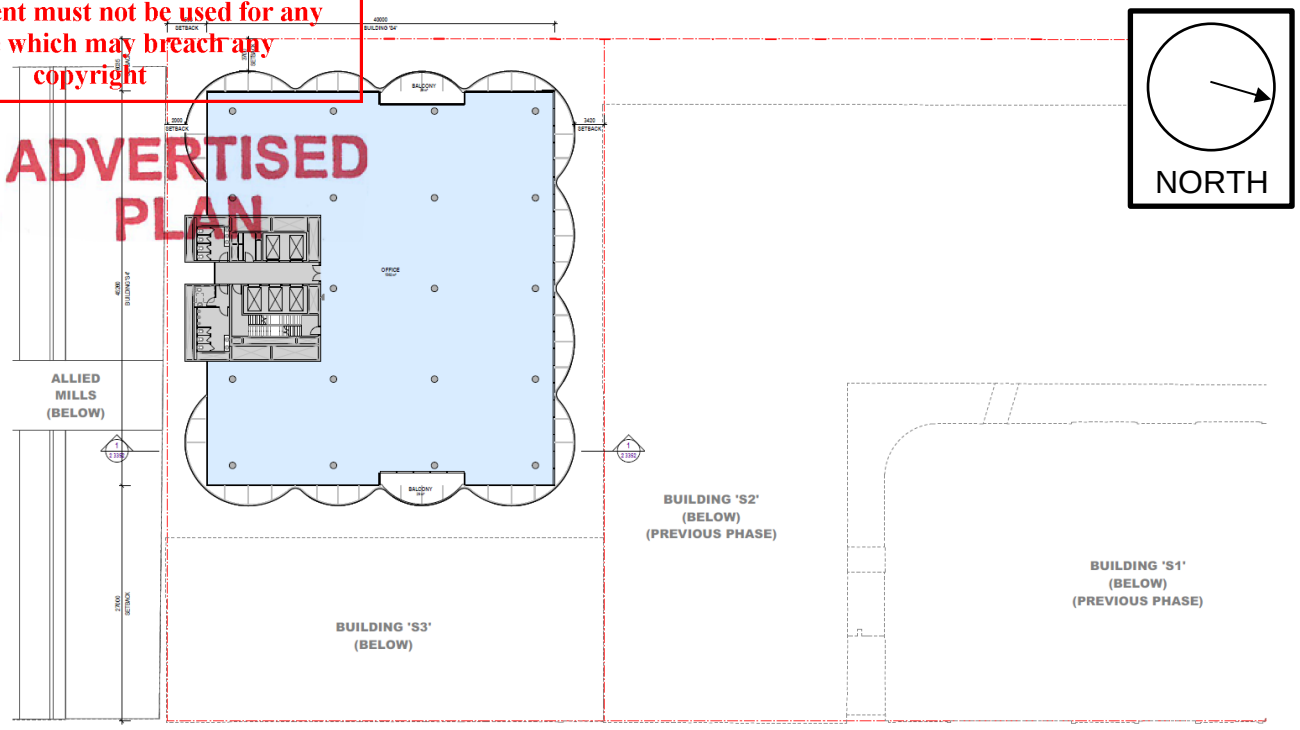


Figure 6: Level 7 floor plan of Stage 2 of the proposed 2-50 Elizabeth Street development

Figure 7: South elevation of Stage 2 of the proposed 2-50 Elizabeth Street development

3. WIND ENVIRONMENT AND EXPOSURE

The strongest and most frequent winds in the Melbourne Region come from the north and west sectors with secondary strong winds coming from the south sector; east sector winds are relatively light and infrequent.

The location of the proposed development would be immediately surrounded by the Stage 1 Young Husband development buildings of up to 5 levels to the north, 2 levels to the east and approximately 7 level silo buildings to the south. The terrain immediately west of the proposed development is dominated by the train line and beyond that 1-2 level typical suburban housing. Beyond the approximately 7 level silo buildings to the south are other multi-level warehouse and office buildings. To the north, the terrain is characterised by 1-2 level typical suburban housing and taller 4-5 level apartment buildings and warehouses on Macaulay Road. To the east, terrain is characterised by 1-2 level industrial warehouses and offices. In the far field to the southeast are the taller buildings of the Melbourne CBD and to the west is the open terrain of J.J. Holland Park, Flemington Racecourse and the Maribyrnong River.

Based on the above proximity description, it would be expected that the lower levels of the S4 building and most of the height of the S3 building of the proposed Stage 2 development would have reasonable shielding for direct wind exposure for all wind directions. The Stage 1 Young Husband development buildings of 5 levels to the north provide shielding from north sector winds for approximately half of the S4 building's height. The silo buildings to the south of the proposed development provide complete shielding from south sector winds. The upper levels of the S4 building of the proposed development would be expected to have direct exposure to north, east and west wind flow as the building extends above the adjacent surrounding buildings.

4 ASSESSMENT CRITERIA

This wind assessment will make reference to the following environmental wind criteria for outdoor activities:

In main public access-ways wind conditions are considered

(a) unacceptable if the peak gust speed during the hourly mean with a probability of exceedence of 0.1% in any 22.5° wind direction sector exceeds 23ms^{-1} (the gust wind speed at which people begin to get blown over);

(b) generally acceptable for walking in urban and suburban areas [Walking criterion] if the peak gust speed during the hourly mean with a probability of exceedence of 0.1% in any 22.5° wind direction sector does not exceed 16 ms^{-1} (which results in half the wind pressure of a 23 ms^{-1} gust).

For more recreational activities wind conditions are considered

(c) generally acceptable for short term stationary exposure activities [Standing criterion] (window shopping, standing or sitting in plazas) if the peak gust speed during the hourly mean with a probability of exceedence of 0.1% in any 22.5° wind direction sector does not exceed 13 ms^{-1};

(d) generally acceptable for long term stationary exposure activities [Sitting criterion] (outdoor dining areas - e.g. restaurants/cafes, theatres) if the peak gust speed during the hourly mean with a probability of exceedence of 0.1% in any 22.5° wind direction sector does not exceed 10 ms^{-1}.

The probability of exceedence of 0.1% relates approximately to the annual maximum mean wind speed occurrence for each wind direction sector.

5. RECOMMENDED WIND COMFORT CRITERIA

The following wind comfort criteria are recommended:

Streetscapes	Walking
Building Entrances	Standing (short term exposure)
Outdoor Seating (retail)	Sitting (long exposure)
Outdoor Elevated Terraces	Walking

The wind conditions on private outdoor terraces have been recommended to satisfy the walking criterion as these spaces could be considered elective when external conditions would be perceived as acceptable for the desired activity. If the outdoor terraces are intended to be used as breakout spaces for commercial offices then standing and sitting criteria may be appropriate due to an expectation of higher utilisation. Users of these terraces will need to be educated on the wind effects and loose objects should not be left on an unattended terrace.

6. WIND ASSESSMENT

6.1 Elizabeth Street

Due to the exposure of the upper levels of the north façade of the S4 building above the Stage 1 development, the wind conditions in Elizabeth Street would be characterised by wind flow from the north, northeast and northwest wind directions being deflected off the northeast corner of the S4 building into Elizabeth Street. This effect would not be expected to occur at the southeast corner of the S4 building due to the shielding of the south façade for most of the building's height by the surrounding buildings from the south wind directions, as discussed in Section 5. The size of building S4 would be expected to provide shielding to Elizabeth Street from west sector winds but induce some downwash into Elizabeth Street for east sector winds. Wind flow deflected around the northeast corner into Elizabeth Street would be expected to increase the wind conditions on the east side of Elizabeth Street, at the intersection with Fink Street and in the carpark at the corner of Fink and Elizabeth Streets. The curved shape of the S4 building corners would be expected to encourage some wind flow captured on the north facade to be deflected around the building rather than it being induced to ground level. The wind conditions along Elizabeth Street would be expected increase relative to the existing conditions and be up to the walking criterion. It would be recommended that the wind conditions in Elizabeth Street be quantified by a wind tunnel model study.

The pedestrian entrance to the Lower Ground floor office of the S3 building on Elizabeth Street would be expected to be protected from the wind flow being deflected off the northeast corner of the S4 building by the upper levels of the S3 building and so the wind conditions at this location would be expected to satisfy the standing criterion.

6.2 Courtyard

The wind conditions in the Courtyard between buildings S3 and S4 would be expected to be characterised by the pressure difference between the north and south sides of the Stage 2 development arising from north sector winds. Wind flow from the north, northeast

and northwest wind directions would be incident upon the broad north face of the S4 building and so some downwash would be induced to ground level. The conditions in the Courtyard could be perceived as windy due to wind flow being sucked through the narrow passage as a result of the pressure difference between each end. The wind conditions in the Courtyard would be expected to satisfy the standing criterion for east, south and west sector winds but would be up to the walking criterion for north sector winds. The drawings provided by Woods Bagot indicate outdoor seating in the Courtyard and so wind tunnel testing would be recommended to develop wind amelioration strategies to make the Courtyard area more amenable.

The entrance to the S4 building retail tenancy is located at the northeast corner of the building but benefits by being set in from the façade line. However, pedestrians walking up and down the stairs, which are exposed to wind flow, would be expected to experience flow accelerating around the corner due to north, northeast and northwest sector winds and the wind conditions at the stairs would be expected to satisfy the walking criterion but would be expected to improve if the entrance and stairs were moved away from the building corner.

The wind conditions at the S3 building entrance to the main office lobby and the Food and Drink Premises would be characterised by north, northeast and northwest wind flows being deflected around the northeast corner of the S4 building towards the east side of the Courtyard as well as downwash off the north face of the building. The wind conditions at the entrances would be expected to satisfy the walking criterion but would be expected to improve if the entrances were inset into the façade.

6.3 Internal Laneways and Under-Croft Passage

The wind flow through the building S4 under-croft passage extending from the landscaping area at the west side of the site to the laneway on the north side of the Stage 2 Development would be driven by the pressure difference across the S4 building and wind conditions within would be expected to be noticeable and perceived as uncomfortable. The wind conditions in the under-croft passage and the building S4 main office lobby, retail tenancy and Food and Drink Premises within it would be expected to satisfy the walking

criterion. Sealing the under-croft at one end would be expected to reduce these wind conditions considerably.

The wind conditions in the laneways along the north and south sides of the Stage 2 development would be characterised by the pressure difference between each end as well as by the downwash induced to the lower levels by the north and west S4 building faces. Southwest, west and northwest sector winds would be expected to be deflected around the northwest and southwest corners of the S4 building causing wind flow to accelerate into the laneway entrances. The pressure difference between the east and west ends of both the Artist's Laneway and the laneway on the north side of the Stage 2 Development on days with west sector winds would cause wind conditions in the laneways to be noticeable and perceived as uncomfortable. Similar effects would be expected in the laneway on the north side of the Stage 2 development during northeast, north and northwest sector winds due to wind flow accelerating around the northeast corner of the S4 building. Wind flow from the west wind directions would be expected to be funnelled along the laneways and could be subject to local flow accelerations at the west entry points. Downwash from the north and south façades due to north and south sector winds would also be expected to induce some wind flow into the laneways. With these effects in mind, the wind conditions in the laneway on the north side of the Stage 2 site and in the Artist's Laneway would be expected to satisfy the walking criterion.

6.4 Western Landscaping Area

The wind conditions in the Western Landscaping area would be influenced by a combination of downwash from the west façade of the S4 building being induced to ground level due to the west sector winds and, as discussed in previous sections, wind flow accelerating around the northwest and southwest corners of the S4 building due to northwest, west and southwest sector winds. The under-croft would be expected to capture wind flow deflected around the S4 building's corners and induced to ground level causing local accelerations at the tenancy entrances and the entrance to the under-croft passage. Based on the above scenario, the wind conditions in the landscaping area would be expected to be within the walking criterion for the north, east and south wind directions but would be expected to be up to the walking criterion at the S4 building corners for northwest,

west and southwest sector winds. It would be recommended that the wind conditions in these areas be quantified by a wind tunnel model study and wind mitigation strategies be developed if required to ensure the required comfort criteria suitable for the intended activities are satisfied.

The entrances to the Manufacturing Sales tenancy and the Food and Drink Premises are located behind the curved external façade and the building under-croft. The wind conditions at the entrances would be expected to satisfy the standing criterion for the north, east and south wind directions and to satisfy the walking criterion for northwest, west and southwest sector winds.

6.5 Outdoor Terraces

The building S4 terraces are located between the square office building and the curved outer façade. The building is setback at varying corners and inset at different locations depending on the level. Holes in the curved façade at the terraces expose the terraces to direct wind flow, but the curved façade that surrounds the building would also provide shielding and deflect some of the wind flow around the terraces. The wind conditions at each terrace depend on their exposure to direct and deflected wind flow. The wind conditions on the terraces away from the building corners for all wind directions would be expected to satisfy the walking criterion. The wind conditions on the terraces at the building corners would be expected to be up to, and at the higher levels on the northwest, northeast and southwest corners possibly exceed, the criterion for walking comfort. Wind mitigation strategies, such as increased balustrade heights and full height screens, would need to be considered to mitigate wind conditions on the corner terraces. It would be recommended that the wind conditions in these areas be quantified by a wind tunnel model study and wind mitigation strategies be developed if required to ensure the required comfort criteria are satisfied.

Due to the exposure to the light and infrequent east wind directions, and the shielding provided by the buildings to the north and south of the S3 building as well as by the S4 building, the wind conditions on the S3 building Level 2 and 4 terraces would be expected to satisfy the walking criterion. To improve the amenity of the Level 4 outdoor roof terrace

for outdoor stationary activities, the balustrade heights surrounding the terrace could be increased.

It is noted that all terraces are accessed via outward swinging doors. Due to the exposure to direct wind flow and the pressure difference between the internal and the external spaces of the building, it would be expected that swing doors would be difficult to open, and slam open/closed damaging the door mechanisms and/or potentially injuring users. It is therefore recommended that the swing doors be replaced by sliding doors designed for stiffness with button press control and perimeter seals. It should also be noted that when the terrace doors are open there would be air flow into, or out of, the building, which would affect the internal climate of the space (i.e. potential loss of conditioned air and gust breezes). Finally, it would be recommended that any objects to be left permanently on the terrace would be tethered/ fixed securely to the terrace and the fixing/ tethers inspected regularly for damage/ corrosion. Any loose items should not be left on the terrace when unattended.

7. CONCLUSIONS

We have assessed the likely environmental wind conditions in the streetscapes surrounding the proposed Stage 2 Development of 2-50 Elizabeth Street, Kensington detailed in drawings by Woods Bagot Architecture received up to 30th November 2020.

The expected wind conditions in the surrounding streetscapes and internal laneways have been considered and would be expected to be within the walking criterion for most areas but in some areas be up to the walking criterion. The wind conditions at the entrances to both the S3 and S4 building on the Lower Ground and Ground Levels would be expected to satisfy the walking criterion with conditions achieving the standing criterion for a proportion of the wind directions.

The wind conditions on both the S3 and S4 buildings terraces would be expected to satisfy the walking criterion with the exception of the S4 building terraces at the higher levels on the northwest, northeast and southwest corners that would be expected to be up to or possibly exceed, the criterion for walking comfort.

It would be recommended that the wind conditions around the proposed Stage 2 development be quantified by a wind tunnel model study and wind mitigation strategies be developed if required to ensure the required comfort criteria suitable for the intended activities are satisfied.

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